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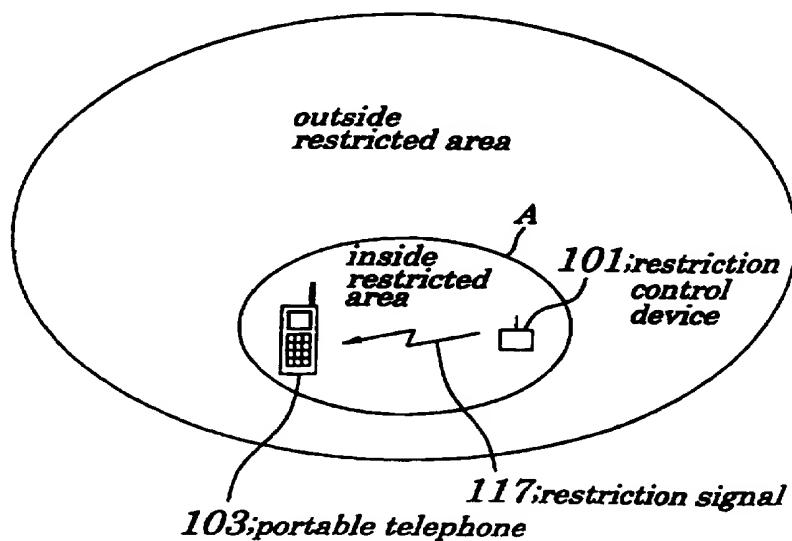
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(54) Abstract Title
A controller for portable telephone which can set a restricted format for call transmission and acceptance and a defined channel for a restricted area.

(57) A portable telephone control system in which a restricted format for a call origination and incoming call acceptance can be set by a controller for a restricted area A, and the use of mobile telecommunication terminals can be restricted by using a specially-defined channel. The portable telephone control system has a restriction control device 101, used for outputting a restricted signal 117 representing a restricted format over a restriction channel defined inside the restricted area A, and has a portable telephone 103 provided in the restricted area A for processing that corresponds to the restricted format for call origination and incoming call acceptance in response to the restriction signal 117.

FIG.1



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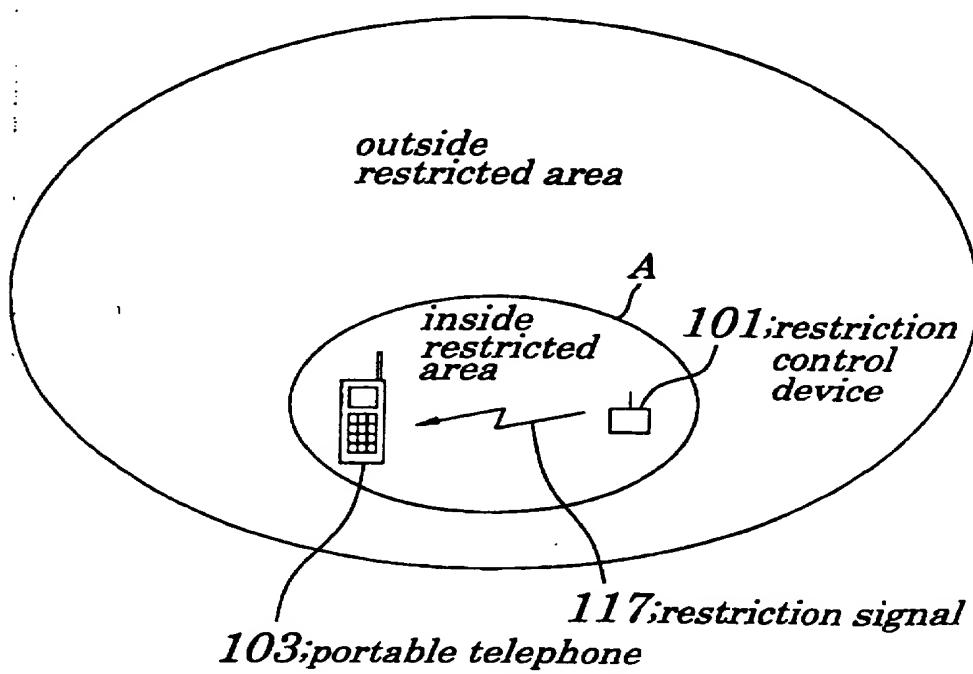
FIG.1

FIG. 2

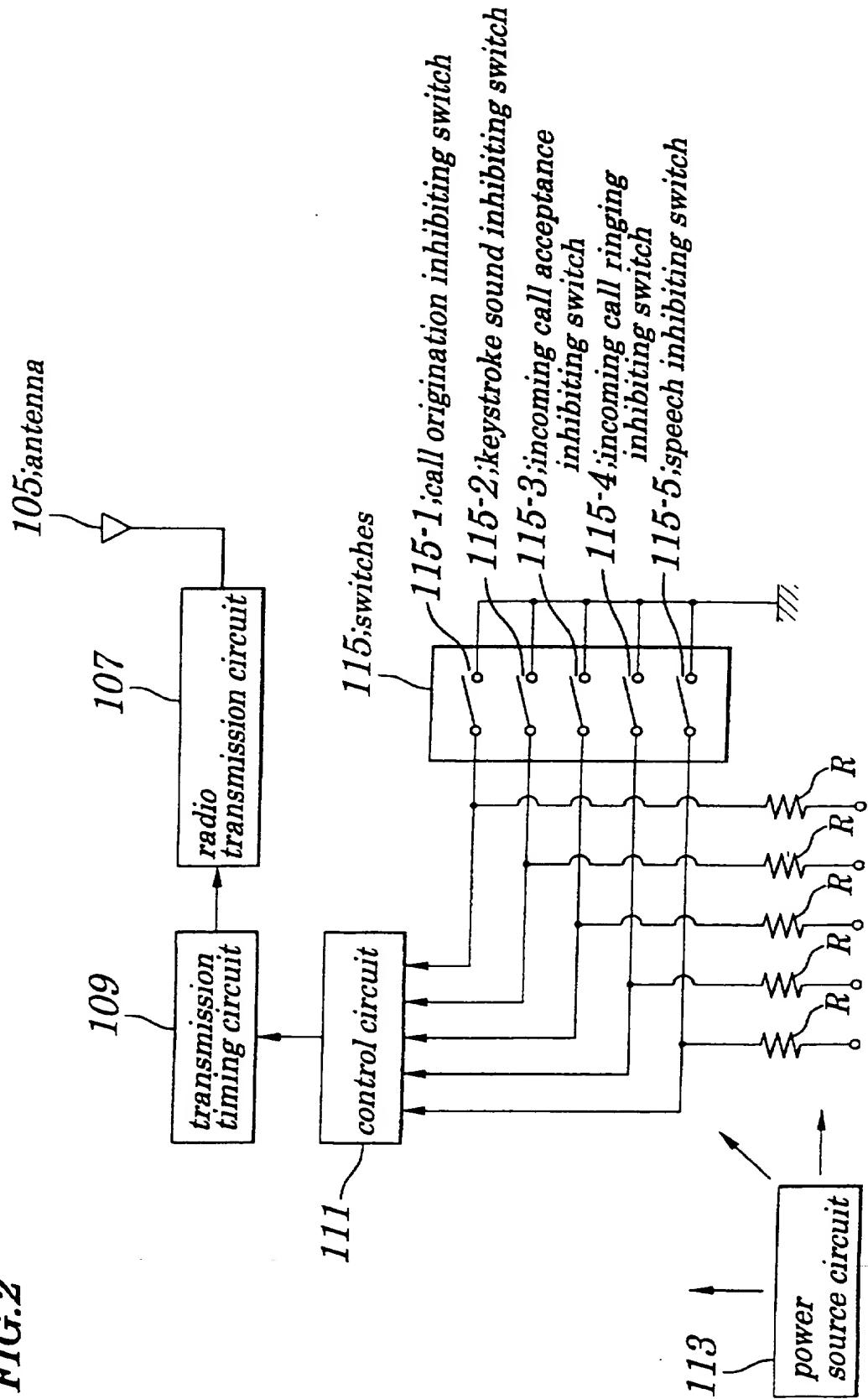


FIG.3

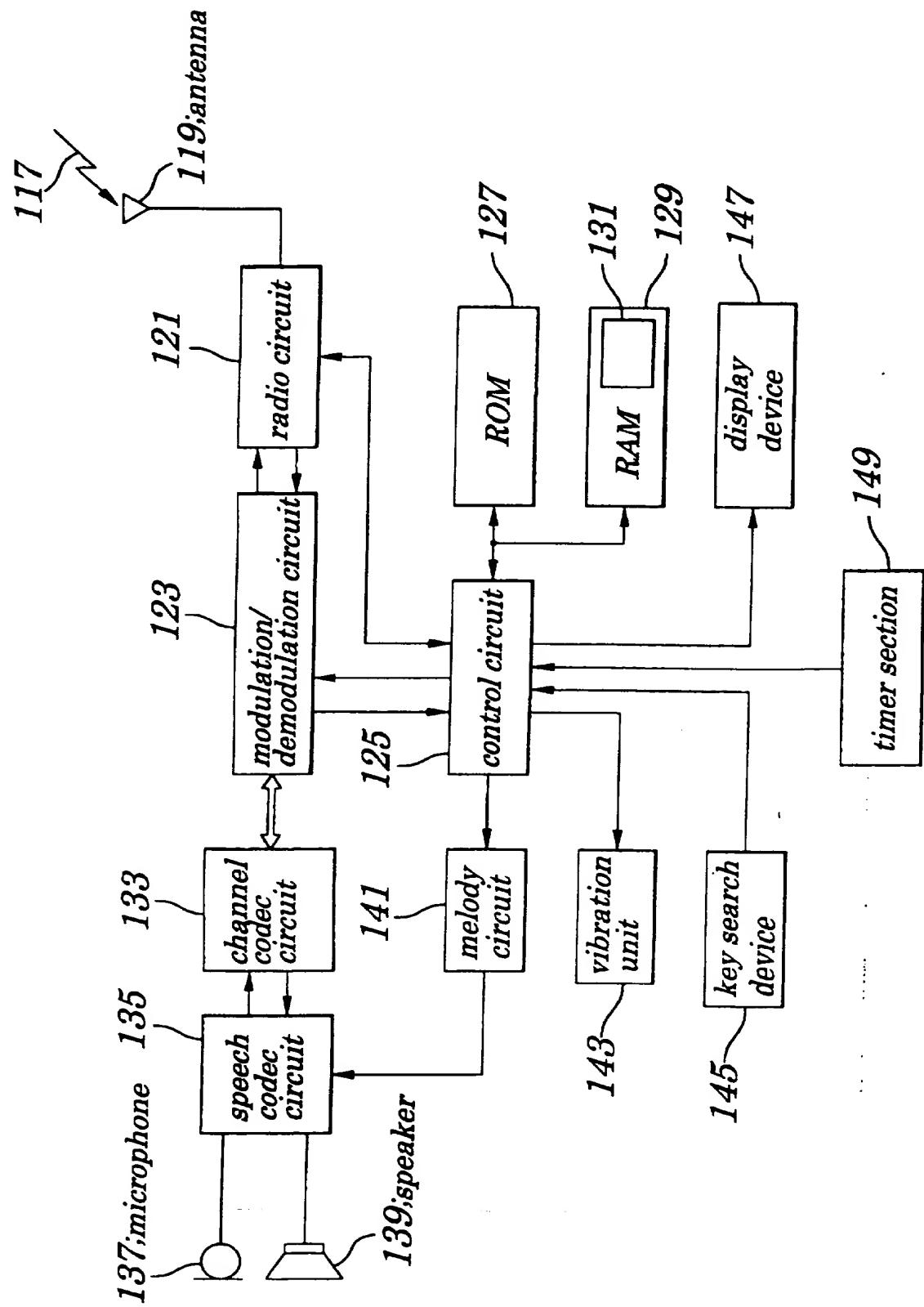


FIG.4*restriction information table*

<i>restriction item</i>
<i>call origination inhibition</i>
<i>keystroke sound inhibition</i>
<i>incoming call inhibition</i>
<i>incoming call ringing inhibition</i>
<i>speech inhibition</i>

FIG.5

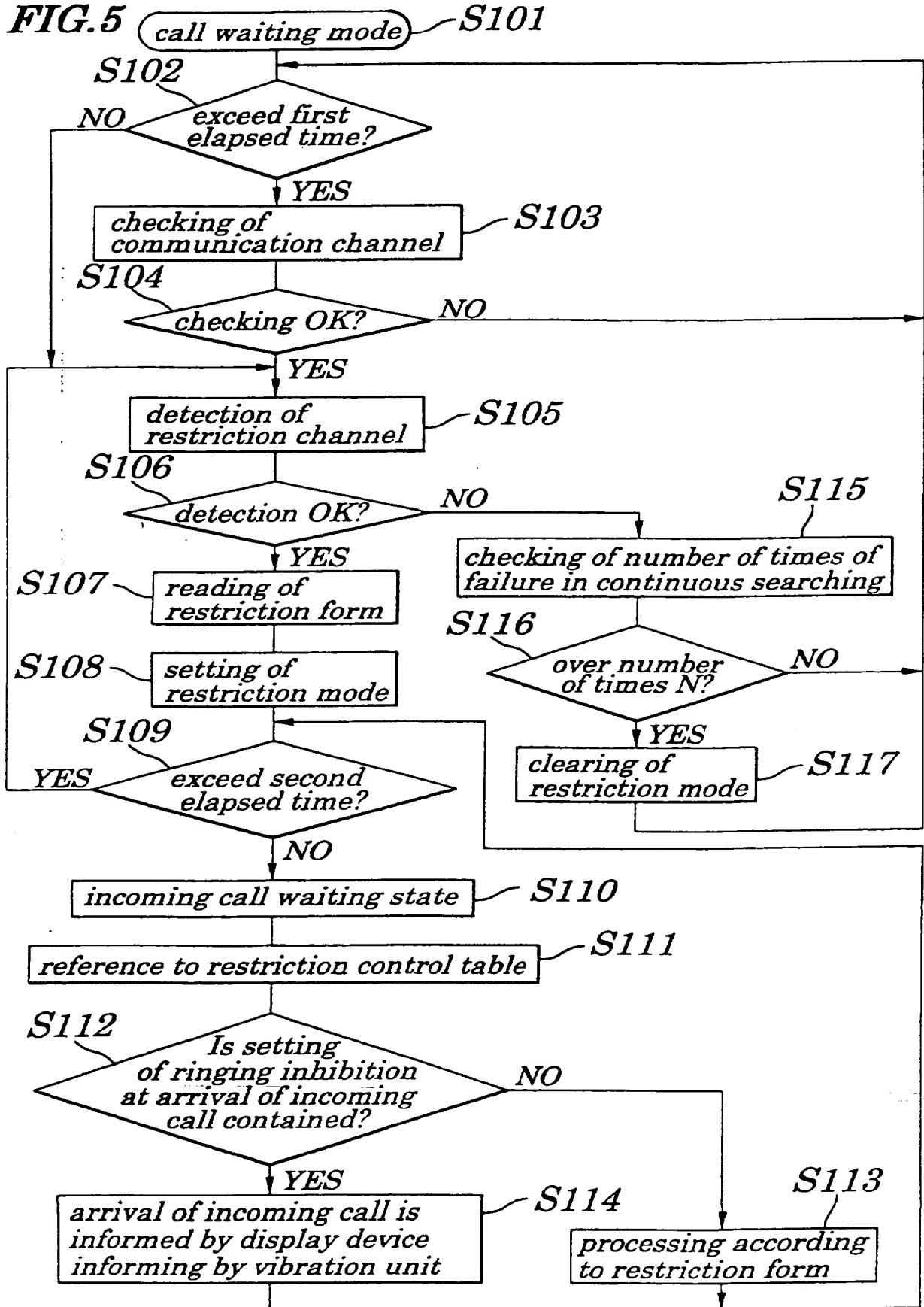


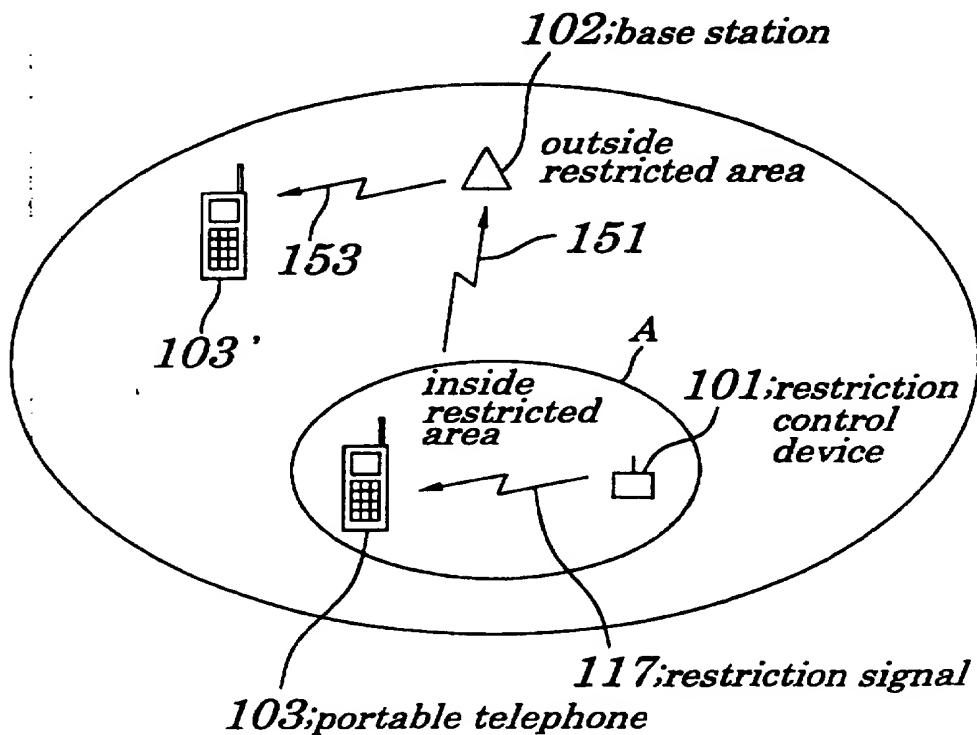
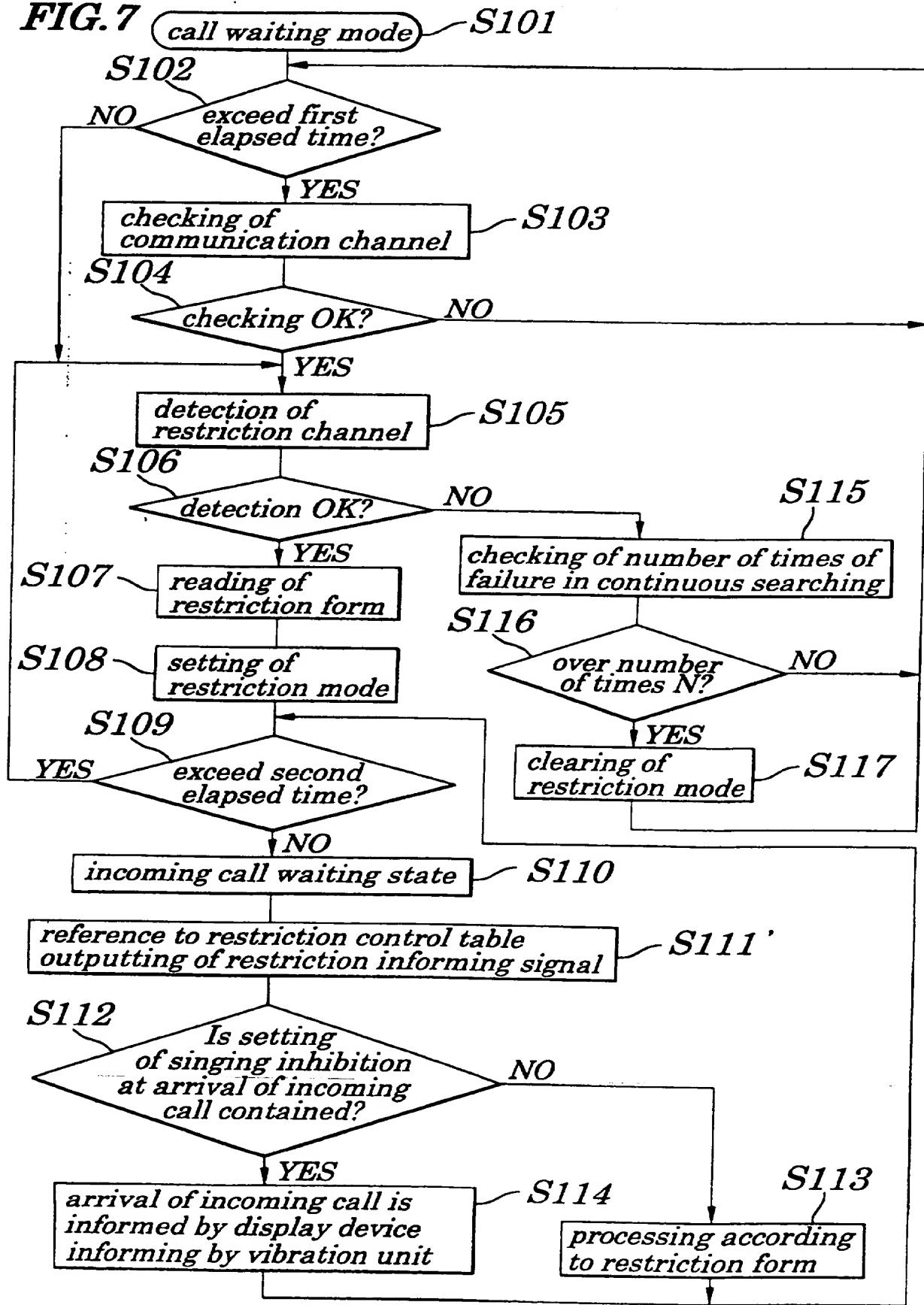
FIG.6

FIG. 7



PORTABLE TELEPHONE CONTROL SYSTEM

BACKGROUND OF THE INVENTION5 1. Field of the Invention:

The present invention relates to a portable telephone control system, and more particularly to a portable telephone control system which allows a portable telephone to be operable 10 inside a restricted area in accordance with a restriction form selected in advance.

2. Description of the Related Art:

15 Communication service systems such as a PHS (Personal Handy-Phone System) and portable telephone and the like are becoming widely-available. On the other hand, though these systems have come into wide use, sounds or voices produced by incoming calls and/or telephone conversations may give 20 discomfort to others especially in a local area such as a train, concert hall or the like in many cases.

Publicly-known technology related to the present invention is disclosed in Japanese Laid-open Patent Application No. Hei10-42362 which provides a portable telephone to prevent a 25 malfunction of medical equipment caused by radio waves generated by a radio child telephone device in hospitals.

Also, a technology related to a portable telephone security device is disclosed in Japanese Laid-open Patent Application No. Hei10-107875. This portable telephone security

device is adapted to inhibit operations of telephones when a sending and receiving circuit of the portable telephone receives a specific radio wave emitted from an oscillator.

Also, a technology related to a portable telephone control system is disclosed in Japanese Laid-open Patent Application No. Hei10-107876. In this portable telephone control system, if a portable telephone is made available in a restricted area defined by an audible frequency band, it can be controlled and hooked down by the portable telephone control system.

Furthermore, a technology related to a cellular device for sending and receiving a use-restriction signal is disclosed in Japanese Laid-open Patent Application No. Hei10-145864. This sending-and-receiving device is comprised of a mobile telecommunication terminal and control-signal sending device. The control-signal sending device is adapted to produce a control signal to inhibit or limit the use of the mobile telecommunication terminal. The mobile telecommunication terminal is composed of a receiving device to receive the control signal, a controlling means to control the use in response to the received control signal, and a display device to inform a user of a state of the controlling means by a display or a voice or similar device.

25

SUMMARY OF THE INVENTION

In view of the above, it is an object of the preferred embodiments of the present invention to provide a portable telephone control system in which: a restriction form for a call origination and incoming

call acceptance can be set by a controller or manager of a restricted area, the use of mobile telecommunication terminals such as a PHS, portable telephone or the like can be restricted by transmitting a restriction signal over a specially-defined 5 channel, and a history of an arrival of incoming calls can be confirmed by a user of the mobile telecommunication terminals for emergency use.

According to a first aspect of the present invention, there is provided a portable telephone control system comprising: 10 a restriction control device to output a restriction signal representing a restriction form over a restriction channel defined in a restricted area; and,

15 a portable telephone made available inside the restricted area to perform processing corresponding to the restriction form at the time of originating a call and accepting an incoming call in response to the restriction signal.

In the foregoing, a preferable mode is one wherein two or more restriction forms are set in advance as the restriction form, and the restriction control device is provided with a 20 selecting means used to select the restriction form out of two or more restriction forms, and wherein a controller of the restriction control device is able to select at least one restriction form out of two or more restriction forms at the time of operating the restriction control device.

25 Also, a preferable mode is one wherein the portable telephone is adapted to perform processing corresponding to the restriction form and to output a restriction informing signal for informing that the portable telephone is set to a restriction mode, and wherein a base station outputs a

restriction message signal to the portable telephone of a call originator made available outside the restricted area.

Also, a preferable mode is one wherein the portable telephone has a detecting means to detect the restriction form from the restriction signals arrived, a restriction information table to store the restriction form detected, and a controlling means to make a reference to the restriction information table at the time of an arrival of the incoming call and to drive a displaying means for displaying information about the arrival 10 of the incoming call when a ringing restriction for the incoming call is contained in the restriction information table as the restriction form and to drive a vibrating means used to inform a user of the arrival of the incoming call.

Furthermore, a preferable mode is one wherein a 15 controlling means mounted in the portable telephone makes a reference to the restriction information table in response to a signal arrived over a communication channel and to control a signal sending means for outputting a restriction informing signal that the portable telephone is set to a restriction mode.

According to a second aspect of the present invention, 20 there is provided a restriction control device comprising:
a selecting means to select a restriction form out of two or more restriction forms set in advance;
a control circuit to detect the restriction form selected;
25 and,

a signal sending means to send a restriction signal representing the restriction form detected so that the portable telephone made available in a restricted area is able to receive the signal over a sending channel defined in advance.

According to a third aspect of the present invention, there is provided a method for restricting speech in a portable telephone control system comprising the steps of:

5 selecting a restriction form out of two or more restriction forms set in advance;

outputting a restriction signal representing the restriction form selected over a control channel defined in a restricted area; and,

10 performing processing corresponding to the restriction form selected in response to the restriction signal at the time of originating a call and accepting an incoming call.

In the foregoing, it is preferable that the above steps further include detecting the restriction form selected out of the arrived control signals, referencing to a restriction 15 information table the restriction form detected at the time of the arrival of the incoming call, and judging whether a ringing restriction for the arrived incoming call is contained in the restriction information table as the restriction form selected, displaying information to inform of the arrival of the incoming 20 call when the ringing restriction for the arrived incoming call is judged to be contained in the restriction information table as the restriction form selected, and informing a user of the arrival of the incoming call by vibration when the ringing restriction for the arrived incoming call is judged to be contained in the restriction information table as the restriction 25 form selected.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred features of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

5 Fig. 1 a schematic block diagram showing a portable telephone control system according to a first embodiment of the present invention;

10 Fig. 2 is a schematic block diagram illustrating a restriction control device used for the portable telephone control system of the first embodiment;

15 Fig. 3 is a schematic block diagram showing a portable telephone in the portable telephone control system of the first embodiment;

Fig. 4 is a diagram explaining a restriction information table of the embodiment;

Fig. 5 is a flow chart explaining operations of the portable telephone control system of the first embodiment;

20 Fig. 6 a schematic block diagram showing a portable telephone control system according to a second embodiment of the present invention; and,

Fig. 7 is a flow chart explaining operations of the portable telephone control system of the second embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

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Best modes of carrying out the present invention will be described in further detail using various embodiments with reference to the accompanying drawings.

First Embodiment

Figure 1 a schematic block diagram showing a portable telephone control system according to a first embodiment of the 5 present invention.

As shown in Fig. 1, the portable telephone control system of the first embodiment is comprised of a restriction control device 101 and a portable telephone 103. The restriction control device 101 is adapted to output a restriction signal 117 10 representing a restriction form over a restriction channel (not shown) defined inside a restricted area A. The restriction channel is specifically provided in addition to a communication channel being ordinarily used in a mobile telecommunication network. The restriction form is selected by a controller or 15 manager of the restricted area in order to restrict the use of the portable telephone made available inside the restricted area. Moreover, the restriction form is chosen from two or more restriction forms designated in advance.

The portable telephone 103 carries out processing 20 corresponding to the restriction form at the time of originating a call and accepting an incoming call in response to the restriction signal 117.

Figure 2 is a schematic block diagram illustrating the restriction control device used for the portable telephone control system of the first embodiment. As depicted in Fig. 2, 25 the restriction control device 101 is comprised of an antenna 105, a radio transmission circuit 107, a transmission timing circuit 109, a control circuit 111, a power source circuit 113 and switches 115.

The switches are adapted to select the restriction form out of two or more predetermined restriction forms. The switches are composed of a call origination inhibiting switch 115-1 used to inhibit a call origination, a keystroke sound inhibiting switch 115-2 used to inhibit a keystroke sound, an incoming call acceptance inhibiting switch 115-3 used to inhibit the acceptance of an incoming call, an incoming call ringing inhibiting switch 115-4 used to inhibit a ringing at the time of acceptance of the incoming call, and a speech inhibiting switch 115-5 used to inhibit a telephone conversation.

The power source circuit is used to power each circuit within the restriction control device. Each terminal of pull-up resistors R connected between the control circuit 111 and the inhibiting switches 115-1 to 115-5 are connected to the power source 113.

The controller of the restricted area A selects any restriction form to restrict operations of the portable telephone made available inside the restricted area A out of the switches, each corresponding to each of the predetermined restriction forms.

Each of the switches corresponding to the restriction form is turned ON or OFF depending on a logic setting. The present invention is not limited to these inhibiting switches representing the restriction form.

The control circuit 111 is adapted to detect any restriction form selected via the switches 115. The restriction form is produced as the restriction signal 117.

The transmission timing chart 109 is used to control timing of sending out the restriction signal 117 produced by the

control circuit 111. The radio transmission circuit 107 is adapted to send out the restriction signal 117 via the antenna 105 with control timing by the transmission timing circuit 109.

5 These transmission means (105, 107 and 109) are used to transmit the restriction signal 117 (representing the form of the restriction) over a transmission channel defined in advance (i.e., over the restriction channel) in accordance with transmission power with which the portable telephone made 10 available in the restricted area A is able to receive the signal.

The control circuit 111 can be implemented by using a central processing unit (CPU) which operates according to a program. In this embodiment, though the transmission timing circuit 109 is displayed as separate from the control circuit 111, both of them are preferably integrated into an LSI (Large 15 Scale Integrated) circuit.

Figure 3 is a schematic block diagram showing a portable telephone in the portable telephone control system of the first embodiment. As depicted in Fig. 3, the portable telephone is 20 comprised of an antenna 119, a radio circuit 121, a modulation/demodulation circuit 123, a control circuit 125, a ROM 127 (Read Only Memory) and a RAM 129 (Random Access Memory).

Moreover, the portable telephone is composed of a channel codec circuit 133, a speech codec circuit 135, a microphone 137, 25 a melody circuit 141, a vibration unit 143, a key search device 145, a display device 147 and a timer section 149.

The RAM 129 stores a restriction information table 131. Restriction items contained in the restriction information table 131 correspond to the restriction form selected by the

restriction control circuit 101. The vibration unit 143 is used to inform a telephone call receiver of the arrival of an incoming call by vibration. The vibration unit 143 is composed of, for example, a vibrator driving circuit (not shown) and a vibrator 5 (not shown).

The display device 147 is adapted to display the information about the arrival of the incoming call. The display device 147 is provided with a liquid crystal display (LCD) device driving circuit (not shown) and a LCD (not shown). The 10 arrival and call arriving time are displayed thereon. If a telephone number of a call originator is available, it will be displayed together with the call arriving time.

The radio circuit 121 is used to receive the restriction signal 117 from the restriction control circuit 101 via the 15 antenna 119. The modulation/demodulation circuit 123 is used to carry out processing of demodulation of the restriction signal received.

The control circuit (control means) 125 is adapted to detect the restriction form in response to the restriction 20 signal demodulated. The control circuit 125 also stores the detected restriction form into the restriction information table 131 contained in the RAM 129. Moreover, the control circuit 125 is used to judge, by referencing the restriction information table 131, whether a ringing restriction at the time 25 of the arrival of an incoming call is contained in the restriction information table 131 (refer to Fig. 4) as the restriction form. That is, the control circuit 125 is adapted to detect any arrival of the incoming call received by the radio circuit 121 and to reference the restriction information

table 131.

The control circuit 125 is also used to drive the display device 147 for informing a call receiver of the arrival of the incoming call when the ringing restriction at the time of the 5 arrival of the call is judged to be contained in the restriction information table 131 as the restriction form and to drive the vibration unit 143 for informing a call receiver of the arrival of the incoming call. The control circuit 125, when judging the ringing restriction at the time of the arrival of the call as 10 being contained in the restriction information table 131 as the restriction form, is adapted to issue a demodulation instruction (not shown) to the modulation/demodulation circuit 123. In response to this demodulation instruction, the modulation/demodulation circuit 123 performs the demodulation 15 of the incoming call signal. The control circuit 125 is also adapted to fetch a telephone number of a call originator when the telephone number is contained in the incoming call signal demodulated. The control circuit 125 then outputs an instruction for displaying the fetched telephone number and the 20 present time provided by the timer section 149 on the display device 147.

The control circuit 125, when no telephone number of the call originator is contained in the demodulated incoming signal, reads a display message "call accepted" stored in the RAM 129. 25 The control circuit 125 issues an instruction for displaying the read display message and the present time provided by the timer section 149 on the display device 147. Moreover, the display message can be freely registered and set by a user of the portable telephone.

The control circuit 125, when judging the ringing restriction at the time of the arrival of the call as being not contained in the restriction information table 131 as the restriction form, is adapted to issue a deactivation instruction (not shown) to the radio circuit 121. The radio circuit 121 stops processing in response to the deactivation instruction.

Figure 5 is a flow chart explaining operations of the portable telephone control system of the first embodiment.

In the example, the restricted area A in a public telecommunication network is located within a range where radio waves reach. The portable telephone 103 is in a call waiting state outside the restricted area where a call origination and an acceptance of the incoming call are possible.

If the portable telephone 103 moves from a point outside the restricted area to a point inside the restricted area A, the portable telephone 103 receives the restriction signal 117 from the restriction control circuit 101. The portable telephone 103 is switched to a restriction mode in accordance with the restriction form contained in the restriction signal 117.

If the portable telephone 103 is moved to a point outside the restricted area, because of not receiving the restriction signal 117, it is returned to its normal mode from its restriction mode.

Referring to the flow chart, while the portable telephone 103 is in a call waiting state outside the restricted area (Step S101), the control circuit 125 is adapted to compare the time elapsed after the start of the call waiting state with

predetermined elapsed time (first elapsed time) (Step S102).

At Step S102, the control circuit 125 calculates elapsed time based on time information provided by the timer section 149. The control circuit 125, if the calculated elapsed time 5 exceeds a predetermined elapsed time (first elapsed time), is adapted to check data by getting access to a communication channel (Step S103). The control circuit 125, if the elapsed time calculated based on the time information provided by the timer section 149 is less than the predetermined time, 10 carries out processing of the Step S105 described later.

At Step S103, the control circuit 125, if the portable telephone cannot receive a radio wave over the communication channel or if data cannot be received normally, issues an instruction to the radio circuit 121 and the 15 modulation/demodulation circuit 123 to instruct them to repeat scanning of the communication channel.

In a state where the checking of the communication channel is complete (Step S104), when the portable telephone 103 is made available inside the restricted area A, the control circuit 125 20 makes an inspection of the restriction channel (Step S105).

The control circuit 125 is adapted to detect the restriction channel through the signal receiving means (119, 121 and 123) (Processing of receiving the restriction signal 117, Step S106).

25 At Step S106, the portable telephone 103, if it cannot receive the restriction signal 117 even if the scanning of the predetermined channel is repeated by the number of times N (Step S115 and S116), clears its restriction mode and returns back to its normal mode.

The control circuit 125 stores the restriction form contained in the restriction signal 117 to the restriction information table 131. At Step S107, when the form of the restriction is stored in the restriction information table 131, 5 the portable telephone 103 moves to the restriction mode (Step S108).

At Step S108, the control circuit 125 periodically calculates the elapsed time based on time required for moving to the restriction mode. The control circuit 125 compares the 10 calculated elapsed time with predetermined elapsed time (second elapsed time). The control circuit 125, if the calculated elapsed time is judged to have exceeded the predetermined time (the second elapsed time), carries out processing of the above Step S105 and subsequent steps.

15 The control circuit 125, when the calculated elapsed time is judged not to have exceeded the predetermined time (the second elapsed time), moves to an incoming call waiting state (Step S110).

At Step S110, the control circuit 125, when detecting an 20 incoming call from the general communication channel, is adapted to make a reference to the restriction information table 131 (Step S111). Moreover, the control circuit 125 is used to judge whether the setting of inhibiting singing at the time of arrival of the incoming call is contained in the restriction 25 information table 131 or not (Step S112).

At Step S112, the control circuit 125, if the setting of inhibiting the ringing at the time of arrival of the incoming call is judged to be contained in the restriction information table 131, controls operations of the display device 147 and

the vibration unit 143 (Step S114).

At Step S111, the control circuit 125, if the setting of inhibiting the ringing at the time of arrival of the incoming call is judged to be not contained in the restriction information table 131, performs processing in accordance with the contents of the restriction form (Step S113) and processing of the Step S109 and subsequent steps.

After the processing of the Step S114 is complete, the control circuit 125 carries out processing of the Step S109 and subsequent steps.

According to the portable telephone control system of the present invention, the restriction form can be changed by the switches 115. In the case where the use of the portable telephone 103 must be restricted, a person responsible for the restriction in such places as a concert hall, train or the like can set the restriction items easily.

The radio waves of the restriction signal 117 emitted by the restriction control device 101 is feeble. Therefore, a leakage of the radio waves to the outdoors can be eliminated, and no case occurs where the portable telephone 103 cannot be used outdoors.

Moreover, the mobile telecommunication terminal restricted by the restriction control device 101 is not limited to portable telephones. The mobile telecommunication terminals, such as PHS system, GSM (Global System of Mobile Communication), CDMA (Code Division Multiple Access) or the like, can be operated in combination with the restriction control device.

Figure 6 a schematic block diagram showing a portable

telephone control system according to a second embodiment of the present invention. The portable telephone control system of this embodiment is comprised of a restriction control device 101, portable telephones 103 and 103', and a base station 102.

5 Figure 7 is a flow chart explaining operations of the portable telephone control system of the second embodiment. The same reference numbers in the drawing of the second embodiment designate parts corresponding to those of the first embodiment. The portable telephone control system of this embodiment
10 differs from the first embodiment in that, instead of the processing at Step S111 in Fig. 5, a processing at Step S111' in Fig. 7 is performed. In the second embodiment, a control circuit 125 mounted within the portable telephone 103 made available inside a restricted area A, in response to an incoming
15 call arrived over a general communication channel, is adapted to reference a restriction information table 131, to control transmitting means (119, 121 and 123), and to output a restriction informing signal 151 for informing that the portable telephone is set to a restriction mode.

20 The base station 102, in response to the restriction informing signal 151, is adapted to send a restriction message signal 153 for providing a message informing that "the portable telephone is now set to the restriction mode" to the portable telephone 103' of a call originator made available outside the
25 restricted area.

Thus, according to the present invention, the use of mobile telecommunication terminals such as the PHS, portable telephones or the like can be restricted by using a specially-defined channel and the restriction form for the call

origination and incoming call acceptance can be set in advance by a controller of the restricted area.

While the present invention has been described in its preferred embodiments, it is to be understood that the words which have been used are words of description rather than limitation, and that changes may be made to the invention without departing from its scope as defined by the appended claims.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features.

Reference numbers appearing in the claims are by way of illustration only and should be disregarded when interpreting the scope of the claims.

The text of the abstract filed herewith is repeated here as part of the specification.

A portable telephone control system in which a restriction form for a call origination and incoming call acceptance can be set by a controller of a restricted area, and the use of mobile telecommunication terminals can be restricted by using a specially-defined channel. The portable telephone control system is provided with a restriction control device, used to output a restriction signal representing a restriction form over a restriction channel defined inside the restricted area, and a portable telephone made available in the restricted area used to perform processing corresponding to the restriction form for the call origination and incoming call acceptance in response to the restriction signal.

The present application claims priority based on Japanese Patent Application No. Hei10-355252, filed on December 14, 1998.

CLAIMS:

1. A portable telephone control system comprising a transceiver control device for outputting, using a separate transmission channel and over a limited area (A), a signal (117) representing a restricted format; and,

a portable telephone (103) adapted to operate inside the limited area (A) and capable of processing the restricted format signal at the time of originating a call and of accepting an incoming call in response to the restricted format signal (117).

2. A portable telephone adapted to operate in conjunction with a portable telephone control system that comprises a transceiver control device for outputting, using a separate transmission channel and over a limited area (A), a signal (117) representing a restricted format, the portable telephone being adapted to operate inside the limited area (A) and being capable of processing the restricted format signal at the time of originating a call and of accepting an incoming call in response to the restricted formal signal (117).

3. The portable telephone control system comprising:
a restriction control device (101) for outputting a restricted signal (117) representing a restricted format over a restricted channel defined in a restricted area (A); and,
a portable telephone (103) available inside the restricted area (A) for processing the restricted signal according to the restricted format at the time of originating a call, and for accepting an incoming call in response to the restricted format.

4. The portable telephone control system according to claim 3, wherein two or more restricted formats are set in advance as said restricted format, and said restriction control

device (101) is provided with a selecting means (115) used to select said restriction format out of said two or more restricted formats.

5. The portable telephone control system according to claim 3, wherein said portable telephone (103) has a detecting means to detect said restricted format from said restricted signal (117), a restricted information table (131) for storing said detected restricted format, and a controlling means (111) for referencing said restricted information table (131) at the time of arrival of an incoming call and for driving a displaying means (147) for displaying information of the arrival of said incoming call when a singing restriction for said incoming call is contained in said restricted information table (131) as said restricted format, and for driving a vibrating means (143) used to inform a user of the arrival of said incoming call.

6. A restriction control device (101) comprising:
a selecting means (115) for selecting a restricted format out of two or more restricted formats set in advance;
a control circuit (125) for detecting the restricted format that is selected; and,
a signal sending means (107) for sending a restricted signal (117) representing said detected restricted format so that said portable telephone (103) available in a restricted area (A) is able to receive said signal over a sending channel defined in advance.

7. A method for restricting speech in a portable telephone control system comprising the steps of:

selecting a restricted format out of two or more restricted formats set in advance;
outputting a restricted signal (117) representing said

selected restricted format over a control channel defined in a restricted area (A); and,

performing processing corresponding to said selected restricted format in response to said restricted signal (117) at the time of originating a call and accepting an incoming call.

8. The method for restricting speech in a portable telephone (103) according to claim 5, wherein said steps further include detecting said selected restrictive format from a received control signal, referencing to a restricted information table (131) said restricted format detected at the time of the arrival of said incoming call, and judging whether a ringing restriction for said arrived incoming call is contained in said restriction information table (131) as said selected restricted format;

displaying information to inform of arrival of said incoming call when said ringing restriction for said incoming call is judged to be contained in said restricted information table (131) as said selected restricted format; and,

informing a user of the arrival of said incoming call by vibration when said ringing restriction for said incoming call is judged to be contained in said restricted information table (131) as said selected restricted format.

9. A portable telephone control system substantially as herein described with reference to and as shown in the accompanying drawings.

10. A method for restricting speech in a portable telephone control system, the method being substantially as herein described with reference to and as shown in the accompanying drawings.



Application No: GB 9929556.0
Claims searched: 1-8

21 Examiner: Hannah Bryant
Date of search: 11 April 2000

Patents Act 1977

Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H4L (LECN, LERX, LDLX)

Int Cl (Ed.7): H04Q 7/32, 7/34, 7/38, 7/20, 7/22, H04B 7/26, 7/005, H04K 3/00,
H04M 1/00, 1/66, G01S 1/02

Other: Online: WPI EPDOC JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB2325592A (NEC)	
A	GB2314236A (MOTOROLA)	
A	EP0891110A1 (ALCATEL)	
A	JP10327474 (TAKAHASHI)	
A	US5778304 (GRUBE)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.